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ABSTRACT

The first U.S. Pharmacopeia, issued in 1820, listed 296 substances of animal, mineral, or vegetable origin in its primary and secondary lists. Of these 130, nearly all of vegetable origin, represented drugs used by American Indians. The number grew at each decennial revision during the 19th century, though some drugs were listed only for a decade. About 220 drugs of Native American use were listed altogether in the U.S. Pharmacopeia or the National Formulary (which began in 1888) up to the present time. Although the number of such listings has declined since the advent of synthetic drugs about 1890, it is significant that 41 new substances of American Indian usage have become official since 1890. However, only 30 substances of Amerindian origin survived in the 17th revision of the U.S. Pharmacopeia in 1965. These drugs were not always used in the same form by Indians and whites. In the preparation of drugs, whites have used processes, i.e., distillation, which were not known to the Indians. Moreover, Indian usage of remedies has not always corresponded with white usage. This paper presents a brief overview of some of the drugs borrowed by white medicine from the American Indians. These drugs have been grouped into: anesthetics, narcotics, and stimulant drugs; astringents; cathartics; childbirth medicines; febrifuges; vermifuges; emetics; poisons; antibiotics; diabetes remedy; and contraceptives. (Author/NQ)

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AMERICAN INDIAN INFLUENCE ON THE AMERICAN PHARMACOPEIA

Much of the literature dealing with American Indian medicine focuses upon its shamanistic aspects. While ritual played an important part in American Indian curing procedure, there was also extensive use of what has been called rational therapy. In the latter, indigenous botanical drugs played a major part, and this paper is concerned with that aspect. This reporter is a historian without medical expertise, and therefore renders no judgement of his own on the efficacy of the remedies and treatments described.

About 170 drugs which have been or still are official in the Pharmacopeia of the United States or the National Formulary were used by North American Indians north of Mexico, and about fifty more were used by Indians of the Caribbean region and Latin America. These drugs were not always used in the same form by Indians and whites. In the preparation of drugs, whites have used processes, such as distillation, which were not known to the Indians. Moreover, Indian usage of remedies has not always corresponded with white usage. For a number of reasons, a statistical summary of the degree of such correspondence has not been undertaken herein. With these reservations in mind, it can still be said that Indian acquaintance with the physiological effects of a large number of drugs was extensive.[1]

For a long time the acceptance, and even the serious study, of aboriginal drugs was resisted by the learned men of medicine and pharmacy. Many of them were repelled by the "superstitious rites" which often accompanied the native

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curing procedures, and shrank from the notion that "uncivilized" people might have something to teach them. This attitude was exhibited by Dr. Benjamin Rush, in an address before the American Philosophical Association in 1774, wherein he said that "we have no discoveries in the materia medica to hope for from the Indians of North America," because "it would be a reproach to our schools of physic if modern physicians were not more successful than the Indians even in the treatment of their own diseases." Dr. Rush was also of the opinion that Indians were much less sensitive to pain than white people.[2] His negative views on Indian medicine were similar to those of his contemporaries, Dr. Johann David Schöpf of Germany and the influential Scottish physician, Dr. William Cullen.

Because of the prevalence of such attitudes, "Indian medicine" long remained the last resort of the explorer and frontiersman, and was later the adopted child of folk medicine. Only after it had gone through these stages, in the course of centuries, did some of the Indian discoveries attract the attention of scientific medicine. Of course many remedies, such as the over publicized snakebite cures, were found to be of no value, but others, after a long struggle, won official acceptance.

Still, some of the most spectacular drugs were long resisted by the learned men of medicine and pharmacy. Even cinchona bark and its alkaloid, quinine, long suffered from such prejudice. John U. Lloyd wrote in 1918: "In the light of its present supremacy and world renowned importance, the discredit and odium cast upon it in the early records, when its only friends were laymen, charlatans and semi-professional empiricists, seem not almost incomprehensible." Before 1820, when the first U.S. pharmacopeia appeared, Cinchona had overcome the hurdles placed before it, but several decades elapsed before Coca, the divine plant of the Incas, could overcome similar barriers. "Nothwithstanding the evidence of the energy of coca on the South American Indians," wrote Lloyd, "and the identification, half a century ago [i.e., 1860] of its now well-known alkaloid, cocaine, coca was long thereafter considered as physiologically inert, or as simply a mild stimulant,

like tea. Its alleged properties were deemed legendary and imaginary, and its alkaloid was regarded as similar to caffeine, both in constitution and qualities, until Koller, in 1884, confounded the professional world, as well as that of science, by announcing its marvelous qualities as a local anesthetic." Before Koller's work became known, Lloyd added, "physicians using coca were made subjects of ridicule, as being incapable of judging a remedy's qualities; pharmacists making preparations of the drug were looked upon askance, as being concerned in a fraud, while the natives who employed it in their daily life, as well as the travelers who were impressed by what they had observed of its effects, were regarded as involved in ignorance, or imbued with superstitious imaginings."[3] Coca leaves were admitted to the U.S. Pharmacopeia in 1882, but cocaine did not appear there until 1905.

It would be comforting if such resistance to innovation could be charged to scientific caution, but there are those who see in it a trace of ethnocentric arrogance. The anthropologist Weston LaBarre has declared:

> As scientists we cannot afford the luxury of ethnocentric snobbery which assumes a priori that primitive cultures have nothing whatever to contribute to civilization. Our civilization is in fact a compendium of such borrowings, and it is a demonstrable error to believe that contacts of "higher" and "lower" cultures show benefits flowing exclusively in one direction.[4]

It is only fair, however, to pay tribute to those physicians who were not bound by pre-conceptions, and who recognized what was valid in the aboriginal materia medica. Dr. Benjamin S. Barton, of the medical faculty of the University of Pennsylvania, declared in 1798 that it was "obvious, that the Indians of North America are in possession of a number of active and important remedies." While conceding that Indians did not always apply their remedies with "judgement and discernment," and rejecting some of them, such as snakebite cures, he added:

"What treasures of medicine may not be expected from a people, who although destitute of the lights of science, have discovered the properties of some of the most inestimable medicines with which we are acquainted?"[5] Barton wrote a treatise on sixty indigenous plant remedies and turned the interest of his students in that direction. Fourteen of them published dissertations on native remedies and practices.

In 1863 Dr. C. A. Canfield of Monterey, California, brought professional notice to Grindelia, an aboriginal remedy for the skin eruptions caused by poison ivy. Dr. J. H. Bundy, also a Californian, in the 1870s brought to professional attention three Indian drugs which soon won official acceptance: Cascara sagrada (Rhamnus purshiana), a noted cathartic, Oregon grape (Berberis aquifolium), a tonic, and Yerba santa (Eriodictyon californicum), an expectorant used in respiratory ailments. Dr. Harlow Brooks (1871-1936), who studied Ojibwa and Navajo medicine, Dr. Aleš Hrdlička (1869-1943), who reported on the medical practice of southwestern tribes, and Dr. Eric Stone (1892-), the first physician to write a book on American Indian medicine, all deserve mention for their enlightened attitude.

It is not here contended that Indians used scientific methods of experiment and reasoning in adopting remedies and treatment. No one maintains that American Indian medicine, with the possible exception of obstetric practice, was more rational than that of Europe at the time of the discovery of the New World. Whether it was less so may be a debatable question. Although sixteenth century medicine was on the threshold of tremendous progress, it was still filled with such untested theories as the Galenic humors, and shared with primitive medicine the doctrine of signatures. Until the nineteenth century it was much addicted to bleeding and the copious use of cathartics.

The number of Indian simples which has been pronounced worthless is perhaps not greater than the number found in early European works on materia medica which have long since been rejected. (material on top of next page is continuation of this paragraph)

While the Aztecs used such substances as decomposed corpse, excrement, and menstrual blood, along with their herbs, the Pharmacopeia Londinensis of 1618 included mummy dust, human and pigeon excrement, stag's penis, and unicorn's horn. In the eighteenth century, the materia medica of Herman Boerhaave included oil of scorpions, troches of vipers, crab's eyes, and dragon's blood. The foregoing reads like a list of ingredients for a witches brew, but in view of the origin of penicillin, it is hardly the business of a layman to weigh the therapeutic value of seemingly obnoxious substances. However, it seems obvious that some of the aforementioned substances were listed for mythological reasons. Unfortunately the Aztecs, deprived of the benefits of European civilization, were unaware of the existence of dragons and unicorns.

In the present era of scientific medicine, with its spectacular achievements in surgery, organ transplants, "miracle drugs," and other conquests, folk and aboriginal medicine have lost their old halo, and the former exploitation by charlatans of the image of the Indian as a healer has served to obscure those discoveries and contributions of primitive medicine which have won scientific favor. It is not generally known that the worthless nostrums which passed as Indian medicine in the old time medicine shows were in fact the inventions of white promoters and that some of the most valuable drugs in official use originated with the Indians.

With this introduction we proceed to a brief overview of some of the drugs borrowed by white medicine from the American Indians.

Anesthetics, narcotics, and stimulant drugs. William E. Safford rescued the Indian contribution to this group from obscurity about sixty years ago.[6] Many drugs of this class were described in the forgotten works of the sixteenth century writer Bernardino de Sahagún. The daturas, coca, tobacco, cohoba, peyotl, and early forms of what was later called LSD are included in these accounts. Because the so-called "mind expanding" drugs have become such a fad in recent years, especially with the younger set, books dealing with these substances, such as those of Carlos Castaneda, are guaranteed best sellers. An unfortunate result has been that the term "drugs," in the popular mind, has been narrowed to signify narcotics only.

The daturas, of ancient usage among many Indians, served other purposes besides the inducement of hallucinations. Parts of datura plants have been used in both Indian and white medicine not only as an anodyne, but externally in plasters and lotions. The most celebrated aboriginal anesthetic, of course, is the coca, source of the alkaloid cocaine, which has been discussed above.

Astringents. The native materia medica commonly included leaves, flowers, fruits, barks, seeds, or roots used for their astringent effect in diarrhea, hemorrhage, sore mouth, and other disorders requiring such a specific. Roots of Wild geranium (Geranium maculatum) were used externally as a styptic, and internally against diarrhea in both Indian and white medicine. Senecio aureus, or squaw root, is another aboriginal hemostatic, while Goldenseal (Hydrastis canadensis) and Gold thread (Coptis trifolia) have been used in thrush, or sore mouth. Goldenseal was once a celebrated remedy for sore eyes. All of these have been official drugs at various times.

Cathartics. Some of the most widely used cathartic drugs were obtained from the Indians. Cascara sagrada (Rhamnus purshiana) and May apple root (Podophyllum peltatum) are two of the better known members of this group which are still in use. Two once popular drugs of this class, mechoacan and jalap, were obtained from the Mexican Indians. The former was mentioned by Monardes in the Sixteenth century and was listed in the pharmacopeia of London in 1618. Jalap, obtained from a tuberous root, is an ancient aboriginal remedy which was mentioned in the Badianus manuscript of 1552. It became a panacea among white practitioners from John Wesley, the evangelist, to Dr. Benjamin Rush, and beyond.

Childbirth medicines. While Europeans held to the superstitious belief that it was wrong to protect women from the judgement pronounced upon Eve in the Garden of Eden, Indians used numerous medicines to ease and hasten delivery in childbirth. Two of them were eventually adopted into the U.S. pharmacopeia and used for the same purpose. One was corn smut (Ustilago zeae), used

by the Zuni in the same way that ergot was used in white medicine, and cotton root bark, used by the Alabamas and Koasatis to make a tea for women in labor. Both of these drugs have also been used by the two races as emmenagogues.

Febrifuges. The greatest of all botanical fever drugs, the anti-malarial cinchona bark, from which quinine is extracted, was a discovery of South American Indians, though it may not have been used by the advanced Incas. Because some of the early history of cinchona has been wrapped in myth or mystery, some writers have hesitated to grant Indians the credit for the discovery of it, but several authorities have marshalled imposing evidence of aboriginal use of this remedy. H. H. Scott asserted that a Jesuit missionary at Loxa, Peru, was cured of an intermittent fever in 1600 by the cinchona bark he received from an Indian chief.[7]

North American tribes also had numerous febrifuges, many of them of acknowledged efficacy, though said to be of lesser strength than cinchona. The dogwood bark (Cornus florida) used by several tribes and containing properties similar to cinchona, was long used as a substitute for it, as was the bark of yellow poplar (Liriodendron tulipifera) and the herb of boneset (Eupatorium perfoliatum). All became official drugs.

Vermifuges. For a century and a half the most widely used worm medicine in this country was probably the pulverized root of the pinkroot (Spigelia marilandica), a discovery of the Cherokee Indians. Wormseed or Jerusalem oak (Chenopodium ambrosioides) which, despite its name, is an American plant, was used as a vermifuge by the Natchez, and probably also by the Mayas. The Ojibwa vermifuges were the boiled or steeped roots of wild plum (Prunus americana), wild cherry (Prunus serotina), and horsemint (Monarda mollis).

Emetics. The South American ipecac is still esteemed for this purpose. It is obtained from the bark of Cephaelis ipecacuanha, a tree of the Brazilian rain forest, and its use against amebic dysentery was learned from the

natives by William Piso. Its alkaloid derivative, emetine, is still used for the same purpose. Ipecac has been used as both an emetic and a laxative and was once used in the treatment of hepatitis. A well known emetic of the North American Indians which was adopted in official medicine is blood root, (Sanguinaria canadensis). One of Dr. B. S. Barton's students, William Downey, wrote his dissertation on this drug in 1803.

Poisons. Perhaps the most famous of American Indian toxic drugs is the South American arrow poison, curare, prepared from an aqueous extract of Strychnos toxifera, and related plants. Though harmless when taken internally, it is fatal when it penetrates into the blood stream through a wound. Alexander von Humboldt, while at Esmeralda on the Orinoco, observed the preparation of this substance, which he said was "employed in war, in the chase, and singularly enough, as a remedy for gastric derangements."

An enormous literature has grown up about this substance, During the nineteenth century, European physicians began to experiment with curare to cure muscle spasms or paralysis in cases of tetanus, epilepsy, chorea, and rabies. Many patients were lost because of the difficulty of standardizing the drug and determining a safe dosage that would not stop respiration. Since then further progress has been made, so that curare and its by-products are used safely for several purposes. It has been used to stimulate the central nervous system in anesthesia, in abdominal surgery, in shock therapy, convulsive therapy, muscle spasm, and poliomyelitis, as well as in Parkinson's disease and tetanus. Dr. K. B. Thomas statdd that it "has achieved an established place in anesthesia, from which it is not likely to be displaced for some time."[8] With the development of a standardized preparation, Dr. A. R. McIntyre found, the clinical use of curare rapidly increased. He reported that it provided complete muscular relaxation without the use of excessively deep anesthesia. Its main use was in abdominal and thoracic surgery.[9] Curare has also been used in a patented tapeworm remedy. Curare, as reagent, was official in the U.S. Pharmacopeia, 1916-1950. The compound

drug, tucocurarine chloride, has been official since 1950.

Antibiotics. It is possible that some Indians may have stumbled upon the working principle of antibiotics, although they were unaware of how and why the desired results were obtained. This is suggested in the following eighteenth century account, by John Lawson:

> We had a Planter in Carolina who had got an Ulcer in his Leg, which had troubled him a great many Years; at last he applied himself to one of these Indian Conjurers, who was a Pamticough Indian. . . . Now, I am not positive whether he washed the Ulcer with any thing before he used what I am now going to speak of, which was nothing but the rotten, doated Grains of Indian Corn, beaten to a Powder and the soft Down growing on a Turkey's Rump. This Dried the Ulcer up Immediately, and no other Fontanel was made to discharge the Matter, he remaining a healthful Man till the time he had the Misfortune to be drowned, which was many Years after.[10]

Along similar lines, Franz Boas reported that the Kwakiutls drew out boils and swellings by applying to them a soft and slimy fungus called "rotten on the ground."[11] Another possibly antibiotic treatment was reported among the Chickasaws by John R. Swanton. Dirt from the top of an old grave was heated and applied to sores in an ailment called "burning ghost disease."[12]

Diabetes remedy. Dr. Frederick Banting, discover of insulin, searched for an Indian herbal remedy for diabetes, and planned to write a book on Indian and Eskimo medicine.[13] Death prevented completion of this work, but the discovery of oral remedies for diabetes in the 1940s was preceded by medical notice of the effective use of devil's club (Fatsia horrida) for this purpose by Indians of British Columbia.[14]

Contraceptives. Indian drugs which were used to suppress ovulation and control the menstrual cycle started researchers on the road which led to "the pill." Particular notice was drawn to Stoneseed (Lithosperma ruderale), used by Shoshonean

Indians of Nevada, which was tested on laboratory rats and found effective.[15] Yet as late as 1936 Norman E. Himes pronounced a Cherokee oral contraceptive (Cicuta maculata) as useless, not on the basis of laboratory tests, but on the ground that "no drug has yet been discovered which, when taken by mouth, will induce temporary sterility."[16]

Other achievements. Were it not for the limits of this paper, we might relate other little known medical achievements of the American Indians, such as Cartier's account of Indian knowledge of the cause and cure of scurvy, more than two hundred years before James Lind; their understanding of the need for isolation of patients with infectious diseases, their knowledge of asepsis, their rational procedures in childbirth, their use of syringes and their invention of the enema bulb and tube, their great success in treatment of wounds, burns, and fractures, and their sanitary practices. However, information on all of this is available to those who wish to look.

Summary and Conclusions

The first U.S. Pharmacopeia, issued in 1820, listed 296 substances of animal, mineral, or vegetable origin in its primary and secondary lists. Of these, 130, nearly all of vegetable origin, represented drugs used by American Indians. The number grew at each decennial revision during the nineteenth century, though some drugs were listed only for a decade. As previously noted, about 220 drugs of native American use were listed altogether in the USP or the National Formulary (which began in 1888) up to the present time. Although the number of such listings has declined since the advent of synthetic drugs about 1890, it is significant that forty-one new substances of American Indian usage have become official since 1890. However, only thirty substances of Amerindian origin survived in the seventeenth revision of the U.S. Pharmacopeia in 1965.

Several reasons have been given for the decline of botanical drugs, including the Indian plant medicines which won official acceptance. While it is

generally held that some of them, such as ginseng and perhaps sassafras, should never have been listed at all, that fact does not appear to explain the precipitate decline. Much more important, it appears from the literature, has been the development of organic chemistry. The molecular nature of the active principles in plants can be learned in the laboratory, and the desired molecular structure is reproduced synthetically.

Other reasons which are given for the decline of botanicals are the difficulty of standardizing vegetable drugs, due to uneven strength of different samples, the natural obstacles to cultivation of some wild drug plants, the collection of wrong species by careless collectors, the practice of adulteration, the fact that some drugs are at maximum strength only when collected during a certain brief season, that they often lose strength in storage, that some wild plants have become scarce due to over-collecting, and that some have undesirable side effects.

In conclusion, however, it seems fair to say that the American Indians have made some pharmacological contributions worthy of our respect, and that recognition of this fact is long overdue.

-end-

(notes follow)

Notes

[1] Eric Stone, Medicine Among the American Indians (New York: Hafner Publishing Co., 1962, reprint from 1932), passim.

[2] Benjamin Rush, An Inquiry into the Natural History of Medicine Among the Indians of North America (Philadelphia: 1774), p. 123.

[3] John U. Lloyd, Origin and History of the Pharmacopeial Vegetable Drugs (Cincinnati: The Caxton Press, 1921), pp. 63, 91-92.

[4] Weston LaBarre, "Folk Medicine and Folk Science," Journal of American Folk-Lore, LV (October-December, 1942), pp. 199-200.

[5] Benjamin S. Barton, Collections for an Essay Towards a Materia Medica of the United States, 3d ed. (Philadelphia: Edward Early & Co., 1810), p. xiv.

[6] W. E. Safford, "Narcotic Plants and Stimulants of the Ancient Americans," Annual Report, Smithsonian Institution, 1916, pp. 387-424.

[7] H. Harold Scott, History of Tropical Medicine, 2 vols. (London: Edward Arnold & Co., 1939), I, 210.

[8] K. Bryn Thomas, Curare: Its History and Usage (Philadelphia: J. B. Lippincott Co., 1963), p. 125.

[9] A. R. McIntyre, Curare, Its History, Nature and Clinical Use (Chicago: University of Chicago Press, 1949), pp. 193-95.

[10] John Lawson, Lawson's History of North Carolina (Richmond: Garrett and Massie, 1951; reprint from 1714), pp. 231-32.

[11] Franz Boas, "Current Beliefs of the Kwakiutl Indians," Journal of American Folk-Lore, XLV, No. 176 (April-June, 1932), p. 187.

12 John R. Swanton, "Social and Religious Beliefs and Practices of the Chickasaw Indians," 44th Annual Report of the Bureau of American Ethnology, 1926-27. (Washington: Government Printing Office, 1928), p. 268.

13 Seale Harris, Banting's Miracle (Philadelphia: J. B. Lippincott Co., 1946), p. 179.

14 R. C. Large and H. N. Brocklesby, "A Hypoglycaemic Substance from the Roots of the Devil's Club (Fatsia Horrida)," The Canadian Medical Association Journal, XXX, No. 1 (July, 1938), pp. 32-35.

15 Clellan Ford, "Control of Conception in Cross-Cultural Perspective," Annals of the New York Academy of Sciences, LIV (May 2, 1952), p. 766; Henry de Laszlo and Paul S. Henshaw, "Plant Materials Used by Primitive Peoples to Affect Fertility," Science, CXIX, No. 3097 (May 7, 1954), pp. 626-31.

16 Norman E. Himes, Medical History of Contraception (New York: Gamut Press, 1963); reprint from 1936), pp. 12-17.

17 A summary of Amerindian medical achievements is attempted in my book, American Indian Medicine (Norman: University of Oklahoma Press, 1970; paperback reprint, New York: Ballantine Books, 1973).

end of notes